



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,812	03/10/2004	Makoto Mizuno	1232-5335	7123
27123	7590	08/01/2006	EXAMINER	
MORGAN & FINNEGAN, L.L.P. 3 WORLD FINANCIAL CENTER NEW YORK, NY 10281-2101			UNDERWOOD, JARREAS C	
			ART UNIT	PAPER NUMBER

2877

DATE MAILED: 08/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/798,812	Applicant(s) MIZUNO ET AL.	
	Examiner Jarreas C. Underwood	Art Unit 2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17,22,23,25-33 and 38-55 is/are rejected.
- 7) ☒ Claim(s) 18-21,24 and 34-37 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>06/17/04</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to because:

Figures 4 and 20 misspell "YOKE" as "YORK".

Figure 21, element 29 misspells "DRIVING as "RIVING".

On Figure 27, "Z-MEASURING" on the right is assumed to be "X-MEASURING".

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

For purposes of examination, examiner assumes the following corrections.

Specification page 12, line 6, "frame 2" to be "frame 24".

Specification page 12, line 21, "mobbing" to be "moving".

Specification page 19, line 7, "members 3" to be "members 4".

Specification page 21, line 26, "DIGS" to be "FIGS".

Specification page 47, line 19, "insufficient" to be "sufficient".

Specification page 47, line 23 has no period after "63".

Specification page 53, line 24, "cooed" to be "cooled".

Specification page 28, line 7 refers to "magnetic blocks 32" which do not appear on any figure. Specification page 28, line 10 refers to "electromagnets 33" which do not appear on any figure. The practice of referring to a collection of elements with one element number (e.g. magnetic blocks 32) and specific elements with a different number (e.g. magnetic block 35a) is acceptable as long as the appellation is clearly made. Examiner suggests "magnetic blocks 32 (35, 37, 39)" change to "magnetic blocks 32 (elements 35a-c, 37a-b, 39a-b)".

Specification page 40, lines 3-11 imply that element 3 is shown on either Figure 17 or 18. Element 3 does not appear on either Figure.

Specification page 57, line 20 refers to "kinematic mount 62" which does not appear on any figure.

Appropriate correction is required.

Claim Objections

3. Claims 1, 10, 17, 38, 53 and 55 are objected to because of the following informalities:

In claim 1, the phrase "position/inclination" is indefinite. For purposes of examination, examiner will read "position/inclination" as "position and inclination".

In claim 10, examiner reads "constant" to be "contact".

In claim 17 examiner reads "embodiments 1 to 16" to be "claims 1 to 16".

In claim 38, the limitation "laser interferometer" is used twice.

In claims 53 and 55, the phrase "developing said exposed step" is indefinite.

Examiner reads this in view of claim 25 as "developing said exposed body."

Appropriate correction is required.

4. Claim 17 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 17 recites an optical element driven by a positioning apparatus, while claim 1 recites a moving part having an optical element, which is driven by driving means.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 20, 30, 32, 34-37, 39 are rejected under 35 U.S.C. 112, second paragraph.

Art Unit: 2877

6. Claim 20 recites the limitation "fourth measurement means" in line 8. There is insufficient antecedent basis for this limitation in the claim. Claims 18 and 19 specify "second measurement means" and "third measurement means" respectively, however claim 20 is dependant only upon claim 17, which contains a "first measurement means". For purposes of examination, examiner reads "fourth" as "second".

7. Claims 30, 39 recite the limitation "third measurement means". There is insufficient antecedent basis for this limitation in the claim, as first and second measurement means have not been specified. For purposes of examination, examiner reads "third measurement means" as "measurement means".

8. Claim 32 recites the limitation "third measurement means" in line 10, and "fourth" "fifth" and "sixth" in lines 11, 15 and 20, respectively. There is insufficient antecedent basis for these limitations in the claim, as first and second measurement means have not been specified. For purposes of examination, examiner reads "third measurement means" as "measurement means", "fourth" as "first", "fifth" as "second" and "sixth" as "third".

9. Claims 34-37 recite the limitation "fourth measurement means" and "fifth measurement means". There is insufficient antecedent basis for these limitations in the claims, in view of the 35 USC 112, second paragraph rejection of claim 32, above. For purposes of examination, examiner reads "fourth measurement means" as "first measurement means", and "fifth" as "second".

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-17, 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Andeen et al (United States Patent 6,355,994).

12. As to claims 1, 17 Andeen discloses a positioning apparatus comprising:

first measurement means (Figure 5, and column 8, line 57 – column 9, line 16) for measuring a position/inclination of a moving part (Figure 2A, element 240) having an optical element (Figure 5, elements 385, 386) while being kept from contact with said moving part; and

driving means (column 3, lines 31-48) capable of driving said moving part in directions of six axes with respect to a fixed part (Figure 2B, element 210) while being kept from contact with said moving part, based on the result of measurement by said first measurement means.

13. As to claim 2, Andeen discloses everything claimed, as applied above, in addition said driving means (Figures 3A-B & 6A, and column 5, line 35-42) comprise at least six pairs of micro adjustment mechanisms capable of being controlled independently.

14. As to claims 3 and 5, Andeen discloses everything claimed, as applied above in claim 1, in addition said driving means comprise a first magnetic block in at least one of said fixed part and said moving part, and a coil in the other (column 2, line 65 – column

3, line 4). While Andeen does not specifically state the existence of an electromagnet (in reference to claim 5), the phrase “electromagnetic platform actuators” indicates the existence of such.

15. As to claims 4 and 6, Andeen discloses everything claimed, as applied above in claims 3 and 5 respectively, in addition said driving means comprise a first magnetic block in said moving part and a coil in said fixed part (Figure 6B, and column 10, lines 11-17). While other actuators of Andeen comprise a magnetic block in the fixed part and a coil in the moving part, it would have been an obvious matter of design choice to one of ordinary skill in the art at the time of invention to reverse the placement of the magnetic block and coil, because the resulting product would perform an equivalent function.

16. As to claim 7, Andeen discloses everything claimed, as applied above in claim 3, including the first magnetic block being a permanent magnet (Figure 3A). While Andeen does not explicitly state the existence of permanent magnets, the phrase “magnet assembly” (column 3, line 2) and the use of “N” and “S” labels in Figure 3A indicates the existence of such.

17. As to claim 8, Andeen discloses everything claimed, as applied above in claim 1, in addition said first measurement means comprise at least one of a laser interferometer (Figure 5, elements 382, and column 8, lines 57-60), an encoder, an eddy current sensor and an electric capacity sensor.

18. As to claim 9, Andeen discloses everything claimed, as applied above in claim 1, in addition support means for adding a force to said moving part in an antigravity

direction (Figure 2A, element 285). Examiner equates the element description of “raising member” with the claim language “antigravity direction” as the direction comprising “up” is defined by gravity.

19. As to claim 10, Andeen discloses everything claimed, as applied above in claim 9, in addition said support means adds a force to said moving part while being kept from contact with said moving part (Figure 6B, and column 10, lines 11-17).

20. As to claim 11, Andeen discloses everything claimed, as applied above in claim 9, in addition said support means comprises an elastic member (column 9, line 66 – column 10, line 1) coupling said fixed part with said moving part.

21. As to claim 12, Andeen discloses everything claimed, as applied above in claim 9, in addition said support means adds a force substantially equal to the gravity of said moving part to said moving part in an antigravity direction (Figure 6A, element 410, and column 9, lines 44-50).

22. As to claim 13, Andeen discloses everything claimed, as applied above in claim 1, in addition comprising any one of a bellows, a repulsive magnet (Figure 6B, elements 450), a suction magnet and a spring (Figure 7, elements 640 & 650, and Figure 8, element 700).

23. As to claim 14, Andeen discloses everything claimed, as applied above in claim 1, in addition said first measurement means is fixed to said fixed part (column 9, lines 5-16).

24. As to claim 15, Andeen discloses everything claimed, as applied above in claim 1, in addition said moving part is said optical element (Figure 5), and the optical element comprises a target for use in said first measurement means (column 9, lines 5-16).

25. As to claim 16, Andeen discloses everything claimed, as applied above in claim 1, in addition said optical element is a reflection member (column 9, lines 5-16).

26. As to claim 22, Andeen discloses everything claimed, as applied above, in addition the inside of said optical system is kept under vacuum (column 3, lines 21-30).

27. Claims 30, 54 are rejected under 35 U.S.C. 102(b) as being unpatentable by Nishi (United States Patent Application Publication 2002/0018192).

28. As to claim 30, Nishi discloses a positioning apparatus comprising:

- a first moving part (Figure 2, element WST) including an optical element (Figure 7, element FM);

- a first fixed part (Figure 3, element 72);

- first driving means for driving said first moving part with respect to said first fixed part (Figure 2, element 48, and paragraph 0292);

- a second moving part (Figure 2, element RST) including a second optical element (Figure 2, element R);

- a second fixed part (Figure 3, element 72);

- second driving means for driving said second moving part with respect to said second fixed part (Figure 4, elements 30X1, 30X2, 30Y);

measurement means for measuring a relative displacement between said first moving part and said second moving part (Figure 2, elements 50, 110, and paragraph 0044);

a first compensator controlling said first driving means based on information of measurement by said measurement means (Figure 2, elements 48, 78);

and a second compensator controlling said second driving means based on information of measurement by said measurement means (Figure 2, elements 33, 80),

wherein said first optical element and said second optical element are positioned using said first compensator and said second compensator (Figure 2, elements 48, 78 (paragraphs 0292, 0323), and elements 33, 80 (paragraph 0035)).

29. As to claim 54, Nishi discloses everything claimed, as applied above in claim 30, in addition an exposure apparatus comprising the positioning apparatus according to claim 30, wherein said optical element is driven by said positioning apparatus (abstract).

Claim Rejections - 35 USC § 103

30. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

31. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Andeen et al (United States Patent 6,355,994) in view of Nishi (United States Patent 6,841,323).

Andeen discloses everything claimed, as applied above in claim 17, with the exception of the wavelength of light passing through said optical system being 13 to 14

nm. While Andeen mentions the use of extreme ultraviolet (EUV) systems (column 1, lines 25-26), Andeen fails to explicitly teach the use of such wavelengths. However to do so is well known as taught by Nishi. Nishi teaches the wavelength of light passing through said optical system is 13 to 14 nm (column 2, lines 16-25). While the soft X-ray wavelengths mentioned as example are below the range of 13 to 14 nm, the specified EUV spectrum spans between approximately 10 and 100 nm. It would have been obvious to one of ordinary skill in the art at the time of invention to use light of wavelengths 13 to 14 nm in order to take advantage of the higher-energy end of the EUV spectrum.

32. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Andeen et al (United States Patent 6,355,994) in view of Yoshitake et al (United States Patent Application Publication 2003/0121022).

The method would flow from the invention of Andeen, as applied above in claim 17, with the exception of a developing step. However to do so is well known as taught by Yoshitake. Yoshitake teaches an exposure step of exposing a body to be exposed (Figure 23, step 305) and a developing step of developing said exposed step (Figure 23, step 306). It would have been obvious to one of ordinary skill in the art at the time of invention to develop the exposed body, in order to remove the undesired resist.

33. Claims 26, 29, 32, 38 are rejected under 35 U.S.C. 103(a) as being unpatentable by Nishi (United States Patent Application Publication 2002/0018192).

34. As to claim 26, Nishi discloses a positioning apparatus comprising:

a first moving part (Figure 2, element WST) including an optical element (Figure 7, element FM);

a first fixed part (Figure 3, element 72);

first driving means for driving said first moving part with respect to said first fixed part (Figure 2, element 48, and paragraph 0292);

first measurement means for measuring a position of said first moving part with respect to said first fixed part (Figure 2, element ALG);

second measurement means for measuring a displacement of said first moving part (paragraph 0078, element 76X1) with respect to a basic structure (Figure 2, element 22); and

a first compensator controlling said first driving means based on the result of measurement by said second measurement means (Figure 2, elements 48, 78 (paragraphs 0292, 0323), and elements 33, 80 (paragraph 0035)),

wherein said optical element is positioned using said first driving means, said second measurement means and said first compensator, based on the result of measurement by said first measurement means (paragraphs 0035, 0078-9 and 0323).

While Nishi does not explicitly state that the first measurement means (element ALG) is fixed to the frame (element 72), it is stated that the system is separate from the optical system (paragraph 0092). It would be obvious to fix the measurement means to a stationary frame, as shown in Figure 3, in order to provide an stationary frame of reference for alignment purposes.

35. As to Claim 29, Nishi discloses everything claimed, as applied above in claim 26, in addition first measurement means comprises an electric capacity sensor and/or an eddy current sensor and/or a differential trans-displacement sensor and/or laser interferometer (paragraph 32).

36. As to claim 32, Nishi discloses everything claimed, as applied in claim 30, in addition said measurement means comprise:

first measurement means for measuring relative positions of said first moving part and said second moving part with respect to a first direction at three or more locations (Figure 9, elements Mr1, Mr2, Mw, and paragraph 0351);

second measurement means for measuring relative positions of said first moving part and said second moving part with respect to a second direction perpendicular to said first direction at two or more locations (Figure 5, elements 76X1, 76X2, and paragraph 0089); and

third measurement means for measuring relative positions of said first moving part and said second moving part (Figure 5, element 76Y) with respect to a third direction perpendicular to both said first direction and said second direction (paragraphs 0078-9 and 0323).

37. As to claim 33, Nishi discloses everything claimed, as applied above in claim 32, in addition said first direction is almost identical to the direction of the optical axis of said optical element (Figure 2, element AX).

38. As to claim 38, Nishi discloses everything claimed, as applied above in claim 26, in addition said second measurement means comprises any one of a laser

interferometer, an encoder, an electric capacity sensor, an eddy current sensor and a differential trans-displacement sensor and/or laser interferometer (paragraph 0202).

39. As to claim 39, Nishi discloses everything claimed, as applied above in claim 30, in addition said measurement sensor comprises any one of an encoder, an electric capacity sensor, an eddy current sensor and a differential trans-displacement sensor and/or laser interferometer. While Nishi does not explicitly teach the use of an interferometer to directly measure said displacement, the alignment process of Nishi between the mask and substrate stages determines said displacement and comprises a laser interferometer.

40. As to claim 52, Nishi discloses everything claimed, as applied above in claim 26, in addition an exposure apparatus comprising the positioning apparatus according to claim 26, wherein said optical element is driven by said positioning apparatus (abstract).

Claims 27, 28, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (United States Patent Application Publication 2002/0018192) in view of Yoshitake et al (United States Patent 6,869,807).

41. As to claim 27, Nishi discloses everything claimed, as applied above, with the exception of wave aberration measurement means for measuring a wave aberration of an optical system including said optical element, wherein said optical element is positioned based on the result of measurement by said wave aberration measurement means.

However to do so is well known as taught by Yoshitake. Yoshitake teaches wave aberration measurement means for measuring a wave aberration of an optical system

including said optical element, wherein said optical element is positioned based on the result of measurement by said wave aberration measurement means (column 4, lines 28-56). It would have been obvious to one of ordinary skill in the art at the time of invention to use wave aberration measurement means for measuring a wave aberration of an optical system including said optical element, wherein said optical element is positioned based on the result of measurement by said wave aberration measurement means, in order to increase control over the focus and distance determination process.

42. As to claim 28, Nishi in view of Yoshitake discloses everything claimed, as applied above in claim 27, with the exception of said first driving means, said second measurement means and said first compensator position said optical element based on the result of measurement by said first measurement means, and then position said optical element based on the result of measurement by said wave aberration measurement means. However to do so would be a process choice dependant upon the relative resolution of the second and wave aberration measurement means, i.e. one would use a coarse positioning system before a high-resolution positioning system.

43. As to claim 31, Nishi discloses everything claimed, as applied above, with the exception of wave aberration measurement means for measuring a wave aberration of an optical system including said first optical element and said second optical element, wherein said first optical system and said second optical system are positioned based on the result of measurement of said wave aberration measurement means.

However to do so is well known as taught by Yoshitake. Yoshitake teaches comprising wave aberration measurement means for measuring a wave aberration of

an optical system including said first optical element and said second optical element, wherein said first optical system and said second optical system are positioned based on the result of measurement of said wave aberration measurement means (column 4, lines 28-56). It would have been obvious to one of ordinary skill in the art at the time of invention to comprise wave aberration measurement means for measuring a wave aberration of an optical system including said first optical element and said second optical element, wherein said first optical system and said second optical system are positioned based on the result of measurement of said wave aberration measurement means, in order to increase control over the focus and distance determination process.

44. Claims 40-42, 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (United States Patent Application Publication 2002/0018192) in view of Andeen et al (United States Patent 6,355,994).

45. As to claim 40, Nishi discloses everything claimed, as applied above in claim 26, in addition at least one of said first driving means and said second driving means use a linear motor (paragraph 0475). Nishi fails to teach a six-axis micro adjustment mechanism. However to do so is well known as taught by Andeen. Andeen teaches a six-axis micro adjustment mechanism (abstract). It would have been obvious to one of ordinary skill in the art at the time of invention to use a six-axis micro adjustment mechanism, in order to provide more precise alignment of the mask and substrate stages.

46. As to claim 41, Nishi discloses everything claimed, as applied above in claim 26, with the exception of at least one of said first driving means and said second driving

means using a six-axis micro adjustment mechanism using an electromagnet actuator. However to do so is well known as taught by Andeen. Andeen teaches a six-axis micro adjustment mechanism (abstract) using an electromagnet actuator (column 2, line 65 – column 3, line 4).

47. As to claim 42, Nishi discloses everything claimed, as applied above in claim 26, in addition at least one of said first driving means and said second driving means use a piezoelectric element (paragraph 0245). Nishi fails to teach a six-axis micro adjustment mechanism. However to do so is well known as taught by Andeen. Andeen teaches a six-axis micro adjustment mechanism (abstract). It would have been obvious to one of ordinary skill in the art at the time of invention to use a six-axis micro adjustment mechanism in order to provide more precise alignment of the mask and substrate stages.

48. As to claims 45-46, Nishi discloses everything claimed, as applied above in claim 26, with the exception of a vacuum bulkhead between said first moving part and said first fixed part and/or said second moving part and said second fixed part, wherein a space on the first moving part side of said vacuum bulkhead and/or a space on the second moving side of said vacuum bulkhead are kept under high vacuum. However to do so is well known as taught by Andeen. Andeen teaches the platform and/or the frame being a vacuum chamber (Figure 2B, column 3, lines 21-30 and column 5, lines 7-16).

While the frame of Andeen does not include a vacuum bulkhead between said first and second moving parts, applicant is silent on the need for specific placement of

said bulkheads. It would be an obvious matter of design choice to place vacuum bulkheads between said first and second moving parts in order to more easily perform maintenance on one or the other sections, while maintaining the other under vacuum.

49. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (United States Patent Application Publication 2002/0018192) in view of Andeen et al (United States Patent 6,355,994) and in further view of Han et al (United States Patent 6,477,898).

The invention of Nishi in view of Andeen discloses everything claimed, as applied above in claim 45, with the exception that any one of electrolytically polished aluminum, electrolytically polished stainless, titanium, ceramics, fluororesin and glass is used for said vacuum bulkhead. However to do so is well known as taught by Han. Han teaches a vacuum bulkhead comprising glass (column 5, lines 14-25). It would have been obvious to one of ordinary skill in the art at the time of invention to use a glass vacuum bulkhead in order to utilize optical sensing techniques.

50. Claims 43-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (United States Patent Application Publication 2002/0018192) in view of Watanabe et al (United States Patent 6,437,864).

Nishi discloses everything claimed, as applied above in claim 26, with the exception of cooling means cooling said optical element, wherein the cooling means is provided in said first fixed part and/or said second fixed part of said optical element positioning apparatus, said cooling means comprising a Peltier element. However to do so is well known as taught by Watanabe. Watanabe teaches cooling means (Figure 6,

element 25) comprising a Peltier element (column 6, lines 24-43). It would have been obvious to one of ordinary skill in the art at the time of invention to provide in said first fixed part and/or said second fixed part of said optical element positioning apparatus, said cooling means comprising a Peltier element, in order to more accurately maintain a stable temperature.

Claims 48-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (United States Patent Application Publication 2002/0018192) in view of Tanaka (United States Patent 6,940,582).

51. As to claim 48, Nishi discloses everything claimed, as applied above in claim 26, with the exception of a body tube including said first moving part, wherein differential exhaust is used for an opening of the body tube, or purging gas is made to pass into the opening of the body tube. However to do so is well known as taught by Tanaka.

Tanaka teaches a body tube (Figure 1, element 46) including said first moving part (Figure 1, element WST is equivalent to Nishi: Figure 1, element WST as in claim 26), wherein differential exhaust is used for an opening of the body tube (Tanaka: column 7, lines 57-62), or purging gas is made to pass into the opening of the body tube (Tanaka: column 14, lines 32-40). It would have been obvious to one of ordinary skill in the art at the time of invention to use a body tube and purging gas, in order to stabilize humidity and reduce the risk of current arcs.

52. As to claim 49, Nishi in view of Tanaka discloses everything claimed, as applied above in claim 48, with the exception of the purging gas being helium. However to do so is well known as taught by Tanaka. Tanaka teaches the use of the purging gas

being helium (column 14, lines 23-31). It would have been obvious to one of ordinary skill in the art at the time of invention to use helium as a purging gas in order to replace the gas inside the chamber with a non-active gas, thus reducing the risk of current arcs.

53. As to claim 50, Nishi discloses everything claimed, as applied above in claim 26, with the exception of a body tube including said first moving part, wherein a filter is provided at an opening of the body tube. However to do so is well known as taught by Tanaka. Tanaka teaches a body tube (Figure 1, element 46) including said first moving part (Figure 1, element WST is equivalent to Nishi: Figure 1, element WST as in claim 26), wherein a filter is provided at an opening of the body tube (column 22, lines 9-17). It would have been obvious to one of ordinary skill in the art at the time of invention to include a filter in order to remove particulates such as dust.

54. As to claim 51, Nishi in view of Tanaka discloses everything claimed, as applied above in claim 50, with the exception of any one of polypropylene, zirconium, boron, silicon, silicon nitride and beryllium is used for said filter. However to do so is well known as taught by Tanaka. Tanaka teaches any one of polypropylene, zirconium, boron, silicon, silicon nitride and beryllium is used for said filter (column 22, lines 9-17). It would have been obvious to one of ordinary skill in the art at the time of invention to include such a filter in order to remove particulates such as dust.

55. Claims 53 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (United States Patent Application Publication 2002/0018192) in view of Yoshitake et al (United States Patent Application Publication 2003/0121022).

The method would flow from the invention of Nishi, as applied above in claims 52 and 54 respectively, with the exception of a developing step. However to do so is well known as taught by Yoshitake. Yoshitake teaches an exposure step of exposing a body to be exposed (Figure 23, step 305) and a developing step of developing said exposed step (Figure 23, step 306). It would have been obvious to one of ordinary skill in the art at the time of invention to develop the exposed body, in order to remove the undesired resist.

Allowable Subject Matter

Claims 18-19, 20, 21, 24, 34, 35, 36, 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance:

56. As to claim 18, the prior art of record, taken alone or in combination, fails to disclose or render obvious a structure frame supporting a fixed part and measurement means for measuring a position and/or inclination of said fixed part with respect to said structure frame.

57. As to claim 20, the prior art of record, taken alone or in combination, fails to disclose or render obvious a structure frame supporting a fixed part and measurement means for measuring a position and/or inclination of said fixed part with respect to a basic structure that is different from said structure frame.

As to claim 21, the prior art of record, taken alone or in combination, fails to disclose or render obvious wave aberration measurement means for measuring a wave

aberration of said optical system, wherein said measurement means is calibrated by the wave aberration measurement means.

58. As to claim 24, the prior art of record, taken alone or in combination, fails to disclose or render obvious means for cooling said optical element and driving means by radiation.

59. As to claim 34, the prior art of record, taken alone or in combination, fails to disclose or render obvious an apparatus according to claim 32, wherein said first measurement means and said second measurement means comprise: a polarization beam splitter fixed on said second moving part; a second mirror fixed on said second moving part; $1/4 \lambda$ plate placed between said polarization beam splitter and said first mirror and between said polarization beam splitter and said second mirror; a laser light source and a detector provided on almost the opposite side of said first mirror with respect to said polarization beam splitter; and a corner cube prism provided on almost the opposite side of said second mirror with respect to the polarization beam splitter.

60. As to claim 35, the prior art of record, taken alone or in combination, fails to disclose or render obvious an apparatus according to claim 32, wherein said first measurement means and said second measurement means comprise: a bar mirror fixed on a basic structure; a first polarization beam splitter fixed on the first moving part; a first mirror fixed on the first moving part; $1/4 \lambda$ plate provided between the first polarization beam splitter, and the first mirror and the bar mirror; a first laser light source and a first detector provided on almost the opposite side of the first mirror with respect to the first polarization beam splitter; a first corner cube prism provided on

almost the opposite side of the bar mirror with respect to the first polarization beam splitter; a second polarization beam splitter fixed on the second moving part; a second mirror fixed on the second moving part; $1/4 \lambda$ plate provided between the second polarization beam splitter, and the second mirror and the bar mirror; a second laser light source and a second detector provided on almost the opposite side of the second mirror with respect to the second polarization beam splitter; and a second corner cube prism provided on almost the opposite side of the bar mirror with respect to the second reflection beam splitter.

61. As to claim 36, the prior art of record, taken alone or in combination, fails to disclose or render obvious an apparatus according to claim 32, wherein said first measurement means and said second measurement means comprise: a bar mirror fixed on the basic structure; a first mirror fixed on the first moving part; a polarization beam splitter fixed on the second moving part; $1/4 \lambda$ plate provided between the deflection splitter, and the first mirror and the bar mirror; a laser light source provided on almost the opposite side of the first mirror with respect to the polarization beam splitter; and a detector provided on almost the opposite side of the bar mirror with respect to the polarization beam splitter.

62. As to claim 37, the prior art of record, taken alone or in combination, fails to disclose or render obvious an apparatus according to claim 32, wherein said first measurement means and said second measurement means comprise: a prism fixed on the first moving part; a polarization beam splitter fixed on the second moving part; a mirror fixed on the moving part 2; an inclination mirror fixed on the moving part 2; a $1/4$

.lambda. plate provided between the polarization beam splitter and the mirror; a 1/4 .lambda. plate provided between the prism and the inclination mirror; a detector provided on almost the opposite side of the mirror with respect to the polarization beam splitter; and a laser light source provided on almost the opposite side of the prism with respect to the reflection beam splitter.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Hasegawa (United States Patent 6,081,581); Ohtsuka (United States Patent Application Publication 2004/0227915); Ohzeki (United States Patent 6,184,596); Shibazaki (United States Patent Application Publication 2002/0163741); Van Eijk et al (United States Patent 5,172,160); Watson et al (United States Patent 6,922,293).

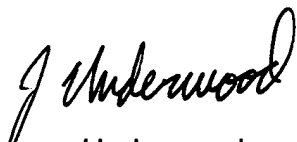
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jarreas C. Underwood whose telephone number is (575) 272-1536. The examiner can normally be reached on Monday-Friday 0630-1500.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley can be reached on (571) 272-2059. The fax phone

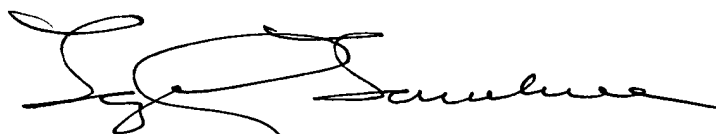
Art Unit: 2877

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Jarreas Underwood
Patent Examiner
Art Unit 2877
7/24/2006



LAYLA G. LAUCHMAN
PRIMARY EXAMINER

ju